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ATRIPLEX ROBUSTA (CHENOPODIACEAE), A NEW PERENNIAL SPECIES FROM NORTHWESTERN UTAH

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Abstract

Atriplex robusta is a newly described species from northwestern Utah. It is abundant along the shoulders of roads and highways and in slightly elevated terrain within and bordering saline playas. It appears to be morphologically closest to *A. tridentata* Kuntze but differs in its larger stature, more woody, caespitose habit, larger urn-shaped fruiting bracts and broader leaves.

On the shoulders of Highway I-80 between Grantsville and Wendover, Tooele County, Utah in northwestern Utah, there are numerous small populations of a distinctive form of perennial *Atriplex*. Because of its robust habit we refer to it as *A. robusta,* described below as a new species. It is particularly abundant about 65 km east of Wendover near the railroad siding at Knolls. In this area *Atriplex canescens* (Pursh) Nutt. and *A. tridentata* Kuntze come together, hybridize and produce a variety of hybrid segregants including plants of *A. robusta* which appear to have spread, as a new species, for several miles along the freeway (I-80) shoulders, in both directions.

Atriplex robusta H. C. Stutz, M. R. Stutz, and S. C. Sanderson, sp. nov. (Fig. 1).—TYPE: USA, Utah, Tooele Co., 1 mi W of Knolls, T15 R13W S15, shoulder of highway I-80, 1280 m elevation, 16 Sep 1977, *H. C. Stutz 8141* (Holotype: BRY; Isotypes, BRY, CA, CAS, GH, MO, NY, RM, UC).

Frutices caespitosi, 40–80 cm alti. Caules erecti vel ascendentes, ramosi a basi ad apicem, dense furfuraceus, 1–8 mm diam., fragilis. Folia oblonga, ascendentia usque appressa, dense furfuracea; folia ephemera verna et aestiva 15–30 mm longa, 5–10 mm lata; folia serotina aestiva et hiberna 3–10 mm longa, 2–5 mm lata, anatomia foliaris Kranz-typi. Plantae dioeciae, raro monoeciae. Flores staminati sessiles, ad brevi-ramulus axillares in angustipaniculas terminales; perianthium campanulatum, 5-partitum ad medium, dense furfuraceum, segmentis ovatis usque ellipticis, 2 mm longis, 1 mm latis; stamina 5, filamentis 1 mm longis, antheris ca. 2 mm longis, 1 mm latis. Flores pistilati solitarii, sessiles, in plerumque sine foliis confertas paniculas terminales. Bracteae fructiferae furfuraceae, compressae, urceolatae, latissimae infra media, 5 mm latae, 7–8 mm longae, exappendiculatae, cum 3–10 marginalibus dentibus, 0.5–2 mm longis, qui medianus longissimus. Utriculus orbiculatus, pericarpio membranceo pellucido. Semena 5 mm diam., testa membranacea, brunnea; radicula supera.

Perennial caespitose shrub, 40–80 cm tall (Fig. 2). Stems erect or ascending, ramified from base to top, densely furfuraceous, 1–8 mm in diameter, brittle. Leaves oblong, obtuse, ascending to appressed, densely furfuraceous, Kranz-type anatomy, ephemeral spring and summer leaves 5–10 mm wide, 15–30 mm long, late summer and winter leaves 2–5 mm wide, 3–10 mm long. Plants dioecious, rarely monoecious; staminate flowers sessile, on short axillary branches in terminal narrow panicles, calyx campanulate, sepals 5, united halfway, densely scurfy, ovate to elliptical, 1 mm wide, 2 mm long, stamens 5, yellow, filaments 1 mm long, anthers 2 mm long, 1 mm wide; pistillate flowers solitary, sessile, in dense, mostly non-leafy, terminal panicles, bracteoles furfuraceous, laterally compressed, urceolate, widest below the middle, 5 mm wide, 7–8 mm long, unappendaged, united to near the apical margin, marginal lips slightly divergent, marginal teeth 3–10, conspicuous, 0.5–2 mm long, central tooth largest. Utricles orbicular, pericarp membranaceous, transparent. Seeds 5 mm in diameter, testa membranaceous, brown, radicle superior. Flowering period: June–July. Chromosome number: $2n = 54$.

Additional Collections: USA, Utah, Tooele Co.: road shoulder W of Knolls, 30 Apr 1975, *K. Harper;* shoulders of highway I-80, Knolls, T15 R13W S15, 25 Sep 1975, *H.C. Stutz 7842;* Knolls, 26 Jul 1977, *H.C. Stutz 8068;* 1 mi S of Knolls, T15 R13W S23, 17 Aug 1978, *H.C. Stutz 8338;* 8 mi W of Knolls, T15 R14W S16, 12 Jul 1979, *H.C. Stutz 8461;* 3 mi W of Knolls on shoulders of old abandoned highway, T15 R13W S21, 20 Sep 1994, *H.C. Stutz 9670;* 1 mi W of Knolls on old highway, 9 Sep 1995, *H.C. Stutz 9831.*

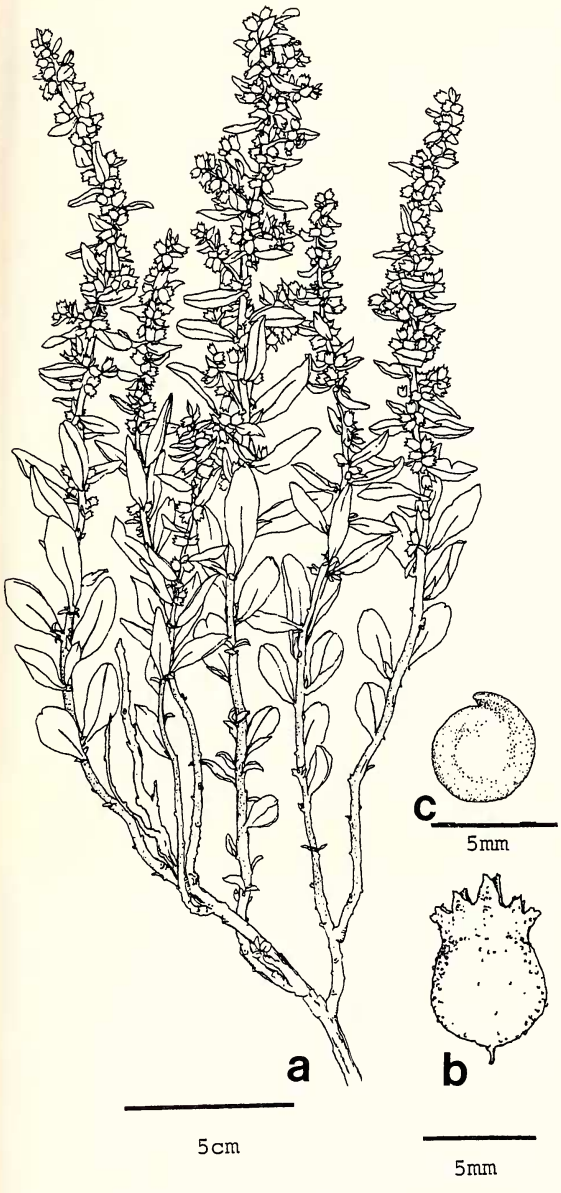

FIG. 1. *Atriplex robusta*. a. Habit. b. Fruiting bract. c. Seed. (Illustrations by Loretta Orgill.)

Atriplex robusta is common in Tooele county, Utah, particularly along the shoulders of Highway I-80 (Fig. 3). Its nearest relative appears to be *A. tridentata* Kuntze, from which it differs in several significant features. The fruiting bracts of *A. robusta* usually have trident or polydent apical margins like those in most *A. tridentata* plants, but they are considerably larger (5 mm wide × 6–8 mm long vs. 3 mm wide × 4 mm long). The fruiting bracts of *A. robusta* are urn-shaped, non-appendaged, whereas those of *A. tridentata* are cuneate and usually appendaged. *A. robusta* plants are much taller than *A. tridentata* (40–80 cm vs. 20–50 cm) and woodier, and in contrast to *A. tridentata* plants, *A. robusta* plants do not form root-sprouts. The leaves of *A. robusta* are much wider than those of *A. tridentata* (5–10 mm vs. 2–5 mm). *Atriplex robusta* differs from *A. canescens* in its non-winged fruiting bracts, more herbaceous habit, smaller stature, broader leaves and urn-shaped utricles.

Associated Species. The principal associates of *A. robusta* are *Allenrolfea occidentalis* (Wats.) Kuntze and *Suaeda torreyana* Wats. Each of these species appears to be well adapted to the conditions along the shoulders of the roads and railroads in these areas. *Allenrolfea* and *Suaeda* plants also occur in some abundance in many of the surrounding saline playas, but *A. robusta* appears to be mostly restricted to the limited habitat along the shoulders of roadways that provides increased amounts of fresh water and improved leaching of salts, and in elevated areas within the saline playas. Near Knolls, where a sizeable population of *A. canescens* occurs, hybrids between *A. robusta* and *A. canescens* are common. Although *A. robusta* is hexaploid and the putative *A. canescens* parent is tetraploid, the resulting pentaploid hybrids are partially fertile and segregant progeny, displaying a wide array of intermediate phenotypes, are fairly common.

A Possible Origin of *Atriplex robusta*

As reported by Stutz et al. (1979), *A. robusta* appears to have been derived from hybrids between tetraploid *A. canescens* ($2n = 36$) and hexaploid *A. tridentata* ($2n = 54$). Near Knolls, Tooele C., Utah, where *A. robusta* is abundant, both *A. canescens* and *A. tridentata* are present, as well as putative hybrids between them and also several plants that appear to be segregants from the hybrids including plants described as *A. robusta*. In this area, *A. canescens* is abundant on sand dunes that extend to the south shoulder of Highway I-80 and a few *A. tridentata* plants are on the adjacent lower, saline flats. Sizeable populations of *A. tridentata* occur a few miles to the east and a few miles to the west, on bottomland clay soils.

The contrast in phenotypes of *A. canescens, A. tridentata* and *A. robusta* plants in this area, is striking. *Atriplex canescens* plants are tall (1–2 meters), caespitose, woody shrubs with large leaves (ca. 5 mm wide × 30 mm long), and large 4-winged fruiting bracts (20 × 20 mm). *Atriplex tridentata* plants are short (ca. 20–50 cm), herbaceous, subshrubs with vigorous root sprouts, and leaves that are mostly small and linear (ca. 5 × 20 mm). *Atriplex robusta* plants are intermediate, in several features supporting the conjecture that it is a derivative from *A. tridentata* × *A. canescens* hybrids. They are larger-statured (40–80 cm) than *A. tridentata* plants and smaller than those of *A. canescens,* more woody than *A. tridentata* plants, less woody than *A. canescens* plants and their distinctive, mostly smooth surfaced, urn-shaped fruiting bracts are much larger than those of *A. tridentata* and smaller

FIG. 2. *Atriplex robusta.* A single plant in a population near Knolls, Tooele Co., Utah. Bar = 30 cm.

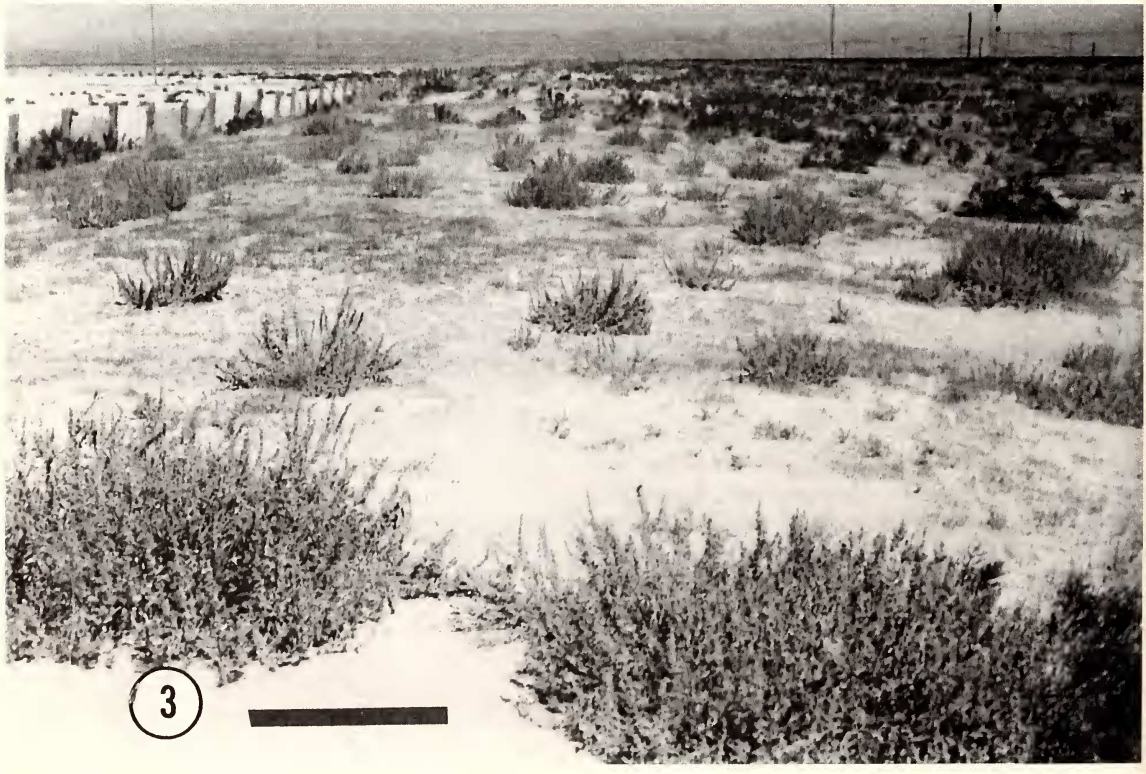

FIG. 3. Population of *Atriplex robusta,* near Knolls, Tooele Co., Utah. Bar = 80 cm for plants in foreground.

than those of *A. canescens.* Collectively, their caespitose habit, intermediate stature, large, broad, obtuse leaves, numerous upright stems and large, unappendaged, urn-shaped fruiting bracts, clearly set *A. robusta* plants apart from those of both putative parents.

Hybrids between *A. tridentata* and *A. canescens* are common whenever they occur together in nature, and although such hybrids are highly sterile pentaploids, fertile derivatives are sometimes derived from them (Stutz et al. 1979; Stutz and Sanderson 1998). Since, at Knolls, there is a large population of *A. canescens,* but only a few *A. tridentata* plants where the hybrids and hybrid derivatives are common, *A. tridentata* plants were probably the female parents of the hybrids. Their relative scarcity may have enhanced the production of hybrid offspring.

If this interpretation of the origin of *A. robusta* is correct, *A. robusta* is probably of rather recent vintage because its preferred habitat, along the shoulders of Highway I-80 and neighboring roadways, is also very young (I-80 was completed in 1969). An early count of *A. robusta* plants on the shoulders of the west-bound lane of I-80 near Knolls, in 1975, by the authors, showed approximately 17,500 plants on the shoulders of the west-bound lanes. Assuming the same density on the shoulders of the east-bound lanes, there were approximately 35,000 plants present in 1975; today there appear to be millions. Their rapid increase was probably enhanced by their high seed production; some individual plants produce more than 25,000 fruits.

Acknowledgments

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